range encompassed by a huge prior art range, is also representative of the prior art, and hence cannot be used to show surprising results over the prior art.

It is respectfully submitted that the Federal Circuit decision sets a legally erroneous precedent with devastating consequences, requiring review by the United States Supreme Court.

II. The Harris And Wahl Invention

Ken Harris and Jacqueline Wahl have discovered that by departing from the teaching of Harris' prior art "gold standard" CM 186LC® nickel-base super alloy by increasing the tantalum content (4.3 - 4.8% Ta vrs. 3.0 - 4.0) and decreasing the chromium content (4.3% - 5.3% Cr vrs. 5.5 - 7.0%), they could obtain a single crystal super alloy casting:

1. exhibiting increased tolerance for grain defects, in order to improve casting yield and reduce component cost, and

2. exhibiting a 32% to 43% improvement in stress-rupture life, substantially extending the service life of jet engine compressor blades made from these alloys

Typical jet engine compressor blades cost about $2000 each and there are about 100 in a jet engine. Thus the increased life of these blades results in maintenance savings of hundreds of thousands of dollars per aircraft over its useful life.

III. THE REJECTED CLAIMS

The rejected Harris and Wahl patent application claims (App. E, 34a-37a) set forth a composition range for each of the minor constituents of the claimed nickel alloy. Claim 1 sets forth the broadest ranges, with successive claims setting forth progressively narrower ranges for the various minor constituents.

Even claim 1 is very narrow:

> Only two of the twelve minor constituents claimed, cobalt (Co) and chromium (Cr) cover ranges of ±0.5% from the midpoint (vs. ±5.0% for Co and ±4.5% for Cr for Yoshinari). The range spread for molybdenum (Mo) is only ±0.1% (vs. ±3.0% for Yoshinari); for tungsten (W) is only ±0.2% (vs. ±6.5% for Yoshinari); for tantalum (Ta) is only ±0.25% (vs. ±6.0% for Yoshinari); for titanium (Ti) is only ±0.1% (vs. ±2.25% for Yoshinari); for aluminum (Al) is only ±0.1% (vs. ±1.5% for Yoshinari); for rhenium (Re) is only ±0.15% (vs. ±2.0% for Yoshinari); for hafnium (Hf) is only ±0.3% (vs. ±1.0% for Yoshinari); for carbon (C) is only ±0.01% (vs. ±0.075 for Yoshinari); for boron (B) is only ±0.004% (vs. ±0.0175 for Yoshinari); and for zirconium (Zr) is only ±0.003% (vs. ±0.0175 for Yoshinari).
>
> (See App. F for a graphic comparison of the broadest Harris and Wahl claim ranges to the broadest prior art ranges.)

In fact, the ranges set forth in the broadest claim of Harris and Wahl are consistent in breadth to the ranges allowed by

the Patent Office in Harris' prior Patent 5,069,873, which encompasses the prior art CM 186LC® alloy.

The dependent claims have even narrower ranges:

1. In claim 2, the range for chromium is narrowed to ±0.3% from the midpoint.

2. Claim 6 additionally narrows the range for tantalum to ±0.15% from the midpoint;

3. Claim 8 additionally narrows the range for hafnium down to ±0.2% from the midpoint;

4. With one minor exception, claim 10 identically covers the CMSX®-486 alloy used in the "unexpected results" experiments set forth in the application as being representative of the claimed invention.[2]

IV. The Federal Circuit Decision

In its decision (App. A), the Federal Circuit affirmed the rejection of all of these claims, holding specifically as follows:

1. In this type of claim, a *prima facie* case of obviousness arises when the ranges of a claimed composition overlap the ranges disclosed in the prior art., citing *In re Peterson*, 315 F. 3d 1325,

---

[2] A minor exception to this is that claim 10 specifies "about 2.9" percent rhenium, while the CMSX®-486 alloy contains 3% rhenium.

1329 (Fed. Cir. 2003); *In re Geisler*, 116 F.3d 1465, 1469 (Fed. Cir. 1997); *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990); and *In re Malagari*, 499 F.2d 1297, 1303 (CCPA 1974);

2. Since Yoshinari discloses a broad range for possible nickel super alloys which substantially encompasses the claimed ranges, the claims are all *prima facie* obvious;

3. The 32-43% increase in stress rupture life does not represent a "difference in kind" that is required to show unexpected results, citing *In re Huang*, 100 F.3d 135, 139 (Fed. Cir. 1996); and

4. Because the claimed CMSX®-486 alloy falls within the broad range of Yoshinari, it is as representative of the prior art as the comparative alloy selected by applicant and cannot possibly be said to establish results unexpectedly superior over the prior art.

REASONS FOR GRANTING THE PETITION

I. *PRIMA FACIE* OBVIOUSNESS SHOULD BE DETERMINED BY A PREPONDERANCE OF THE EVIDENCE, NOT BY THE MECHANICAL APPLICATION OF A RULE OF LAW

Article I, Section 8 of the Constitution gives Congress the power ". . . to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries; . . . ." Congress has exercised this authority by enacting Title 35, which authorizes the grant of patents to inventions which

are useful, new and ***would not have been obvious*** at the time the invention was made.

Obviousness is governed by Title 35 of the United States Code §103, in accordance with principles set down by the United States Supreme Court in *Graham v. John Deere*, 383 U.S. 1, (1966). As is well known to this Court, a *Graham v. John Deere* analysis requires that the legal conclusion of obviousness ***must be based on a foundation of factual determinations***.

The Patent Office has the initial burden of producing a factual basis for a rejection under 35 U.S.C. §103. If it satisfies that burden, it holds the patent application to be "*prima facie* obvious," and the burden shifts to the applicant to establish, usually by proof that the claimed invention yields surprising and unexpected results, that the claimed invention would not have been obvious.

The Patent Office definition of *prima facie* obviousness in PTO Rule 1.56 is consistent with the requirement that a holding of "*prima facie* obviousness" must be based on the factual evidence:

> "a *prima facie* case of unpatentability is established when the information **compels** a conclusion that a claim is unpatentable under the **preponderance of evidence**, burden of proof standards."

Thus, *prima facie* obviousness is a determination based on the ***evidence*** – it must be based on all of the **FACTS**. To establish *prima facie* obviousness, the prior art must compel a conclusion of obviousness, absent evidence or argument to rebut it. *In re Spada*, 911 F.2d 705 (Fed. Cir. 1990). Not only must the prior art be "close" to the claimed subject

matter in order to establish *prima facie* obviousness, but also the prior art must ***suggest*** making the claimed invention. The prior art must provide the ***motivation*** to make the claimed invention. *In re Baird*, 16 F.3d 380 (Fed. Cir. 1994);[3] *In re Jones*, 958 F.2d 347 (Fed. Cir. 1992).[4]

The Federal Circuit in this case has ignored the Patent Office's own definition of *prima facie* obviousness and has held that any time a claimed range is encompassed or overlapped by a prior art range, no matter how broad and speculative or non-enabling, and regardless of preferences leading away from the claimed ranges, it is *prima facie* obvious. That holding is contrary to the law as set forth in 35 U.S.C. §103, as interpreted by the United States Supreme Court in *Graham v. John Deere*, and as interpreted by the Federal Circuit in cases such as *Baird* and *Jones*, *supra*.

It is a fact, of course, that the prior art ranges of Yoshinari encompass substantially all nickel super alloys, including the narrow claimed ranges. However, this is not the only fact which should be considered. There are numerous other facts which the Federal Circuit has erroneously held are not relevant, once the fact of overlap has been established.

---

[3] The fact that a claimed compound may be encompassed by a disclosed generic formula does not by itself render that compound obvious. A disclosure of millions of compounds does not render obvious a claim to three compounds, particularly when that disclosure indicates a preference leading away from the claimed compounds. *Baird*, at p. 382.

[4] Disclosure of chemical genus does not render obvious any species that happens to fall within it.

The relative breath of the overlap to the breath of the prior art disclosure, the amount of experimentation needed to explore the entire breath of the disclosure, and preferences expressed in the prior art leading away from the claimed ranges, all have a profound bearing on whether the person of ordinary skill in the art would find motivation for the claimed invention. Such facts should not be ignored in making a determination of whether or not the preponderance of the evidence compels a conclusion that a claim is unpatentable.

II. THE FEDERAL CIRCUIT HAS PREVIOUSLY HELD THAT THE DISCLOSURE OF A HUGE GENUS DOES NOT RENDER OBVIOUS CLAIMS TO A NARROW SPECIES

The Federal Circuit has previously held in *In re Baird* that "[a] disclosure of millions of compounds does not render obvious a claim to three compounds, particularly when that disclosure indicates a preference leading away from the claimed compounds." *In re Baird*, 16 F.3d 380, 383, 29 USPQ2d 1550, 1552 (Fed. Cir. 1994). The Federal Circuit did not, however, follow its precedent in *In re Baird* in this case. Rather, it chose to rigidly and uncritically apply *In re Peterson*, 315 F.3d 1325 (Fed. Cir. 2003), and other similar cases, as establishing a rule that encompassing or overlapping ranges establish *prima facie* obviousness, without regard for any other facts such as those it previously considered in *In re Baird*.

In so doing, the Federal Circuit ignored its own prior observation in *In re Peterson* that in appropriate factual circumstances, an overlapping range case might be analogous to cases like *In re Baird* and others, in which the prior art discloses a genus encompassing such a vast number of possible compounds, that it cannot be said to render *prima facie* obvious a species encompassing a much smaller number

of compounds. The Federal Circuit stated at footnote 1 in *Peterson* that:

> Although ranges that are not especially broad invite routine experimentation to discover optimum values, rather than require nonobviousness invention, we do not have here any assertion that the disclosed range is so broad as to encompass a very large number of possible distinct compositions. We thus do not need to decide ***whether a disclosed range of such breadth might present a situation analogous to our cases involving the failure of a very broad disclosed genus of substances to render prima facie obvious specific substances within its scope.*** (Emphasis added.)

That issue ***is***, however, ***the principle issue*** in this case. In this case, the prior art encompassing ranges are so broad, that the Patent Office Examiner conceded that "the chance of achieving the claimed composition was small." Yet the Federal Circuit, disregarding this and other facts, still deems that the claimed composition would have been *prima facie* obvious.

The only difference between this case and *In re Baird* is that *Baird* involved millions of speculative compounds that differed discretely by having different substituent groups, whereas this case involves hundreds of millions of speculative compounds which differ from one another along a continuum, by having different amounts of alloyed constituents. It is no more possible to discover by routine experimentation unique utility for a very small set of compounds within a huge set of speculative compounds lying along a huge continuum of compounds than it is to discover by routine experimentation unique utility in a very small set of discrete compounds within a huge set of speculative compounds differing by having

different substituent groups – particularly where in this case and in *Baird* the preferences taught by the prior art teach away from the small set of claimed compounds.

When one recognizes the magnitude of the speculative disclosure of Yoshinari, applies *In re Baird*, and makes a factual inquiry as required by *Graham v. John Deere, supra,* and as required by the Patent Office's own definition of *prima facie* obviousness, one must conclude that the vast and substantially non-enabling speculative disclosure of Yoshinari does not render obvious the relatively narrow ranges claimed by Harris and Wahl.

III. The Yoshinari Disclosed Range of Possible Alloys Is Huge Compared To The Claimed Ranges Of Harris And Wahl

While the exact number has not been calculated, it is safe to say that the Yoshinari ranges encompass millions, if not billions, of possible alloys. The range for nickel alone is 58% to 82%. It is a huge genus. By comparison, Harris and Wahl claim a very narrow range of species within this huge genus.

The Appendix F bar chart illustrates the ranges suggested by Yoshinari for nickel super alloys as compared to the broadest ranges claimed in the Harris and Wahl patent application. The blue bars show the very broad ranges set forth by Yoshinari for each of the different indicated elements. The burgundy bars show what Yoshinari calls his preferred range for these elements--still very broad but narrower. The white bars show the ranges claimed by Harris and Wahl in claim 1, their broadest claim. (The ranges for the three smallest quantity elements are enlarged on page 2 of the appendix.) The Federal Circuit has held that these very narrow ranges claimed by Harris and Wahl are *prima facie*

obvious because they are all encompassed by the very broad ranges set forth in the Yoshinari prior art reference.

IV. The Yoshinari Disclosure Is Speculative And Substantially Non-Enabling Over The Huge Range Of Species Encompassed By The Disclosed Genus

However, the Yoshinari disclosure is substantially non-enabling and speculative. Yoshinari discloses only a single alloy within this huge genus of possible alloys. The alloy he discloses is the prior art CM 186LC® alloy of inventor Ken Harris, which Harris and Wahl specifically distinguish in the present application, and over which the representative CMSX®-486 ***claimed alloy*** shows a 32% to 43% increase in stress-rupture life.

The "examples" in Yoshinari are not examples of the use of specific alloys. They merely substantially restate the broad ranges or preferred ranges set forth previously in the Yoshinari specification. The extent to which any of the millions or billions of other possible nickel super alloys suggested by Yoshinari are actually practical or useful for anything other than a very expensive boat anchor is anybody's guess. Certainly, "undue experimentation" would be required to determine the extent to which Yoshinari's suggested huge range actually discloses any useful alloys, or where in that range such useful alloys might be found.

Millions of experiments would be needed in order to test a representative sample of all possible properties of all possible alloys disclosed by the broad ranges listed at column 3, lines 8-12 of the Yoshinari et al. patent. To prepare and test the mechanical properties of a <u>single</u> alloy costs tens of thousands of dollars. A comprehensive study of the

mechanical properties of all possible alloys of the Yoshinari et al. patent would cost hundreds of millions of dollars.

From a practical standpoint, the Yoshinari disclosure of a huge number of possible nickel super alloys is substantially non-enabling, and is entirely speculative.

V. YOSHINARI'S CLAIMED INVENTION IS A TURBINE VANE, NOT A NICKEL SUPER ALLOY

Yoshinari's disclosure of a huge set of nickel alloys was not intended to be an enabling teaching of actual alloys. Yoshinari doesn't even claim a nickel super alloy. Instead, Yoshinari's patent is directed to a new type of gas turbine blade. Yoshinari's disclosure of a vast set of possible alloys is merely Yoshinari's way of saying that any nickel super alloy which is conceivable will probably work in the claimed turbine blade.

Thus, Yoshinari's expression of a huge range of possible nickel super alloys is not, and is not intended to be, a credible teaching of actual useful nickel super alloys. Its use by the Federal Circuit and the Patent Office to discourage and stifle creative research and development of new nickel super alloys is inappropriate and unjustified, given the purpose of the Yoshinari disclosure.

VI. YOSHINARI'S PREFERRED RANGES TEACH AWAY FROM THE CLAIMED INVENTION

The Federal Circuit also ignores the admonition in *Baird, supra* that the "preferences" expressed in the prior art reference are to be considered in determining whether species claims are *prima facie* obvious in view of the genus taught by

the reference. As in *Baird*, the preferences expressed by Yoshinari teach away from the presently claimed invention.

In *In re Baird*, the Court admonishes that a disclosure of a huge number of compounds does not render obvious a claim to a small set of compounds, "***particularly when that disclosure indicates a preference leading away from the claimed compounds***." *In re Baird* at 1552 (emphasis added). As can be seen by graph 1, even Yoshinari's preferred ranges are considerably broader than the ranges claimed by Harris and Wahl. Nevertheless, these preferred ranges are consistent with the prior art's gold standard alloy, CM 186LC®, by teaching that it is preferred to use alloys with lower tantalum levels and higher chromium levels than those claimed by Harris and Wahl.

In its decision, the Federal Circuit asserts that Yoshinari does not teach away from the claimed range, because "Yoshinari's Example 2 teaches a super alloy having a tantalum content from '3.0 to 7.0' percent, which completely encompasses the claimed range of tantalum." However, this assertion completely overlooks the fact that Example 2 is not an example of an alloy at all! Example 2 is merely another set of very broad ranges, [5] which still leaves a tantalum range of 3-4% as Yoshinari's clearly stated preference. Example 2 is not indicated by Yoshinari to be a preference.

When one looks at the ranges which Yoshinari states are "preferred," one sees that Yoshinari is merely parroting the prior art which teaches alloys with lower tantalum levels and

---

[5] The Example 2 range of 0-12.0% for cobalt is actually broader than the 0-10% set forth in the broadest overall range in the specification.

higher chromium levels than those claimed by Harris and Wahl. In fact in Example 3, Yoshinari states that the alloy used had a chromium element range of 8.0 to 9.0, which is even higher than the 5.5-7.0% chromium used in Yoshinari Example 1, and very much higher than the Harris and Wahl claimed range of 4.3% to 5.3% chromium.

As in *Baird*, the Yoshinari prior art in this case suggests a huge genus of millions or billions of possibilities, while its preferences teach away from the nickel super alloys claimed. Under the authority of *Baird*, such a disclosure of millions or billions of possible alloys with preferences leading away from the claimed alloys does not render obvious a claim to a relatively small, narrow set of alloys within that huge genus.

VII. THE CASES RELIED ON BY THE FEDERAL CIRCUIT ARE DISTINGUISHABLE OR SHOULD BE OVERRULED

During oral argument, Harris and Wahl's counsel was asked whether or not *In re Peterson* should be overruled. Counsel indicated that it would not be necessary to do so, if the Federal Circuit were merely to address the issue asserted in this case, which was not asserted in *In re Peterson*. The Court in *Peterson* specifically stated in Footnote 1 that it did not have before it "any assertion that the disclosed range is so broad as to encompass a very large number of possible distinct compositions." Had this assertion been considered by the Federal Circuit the outcome of this case would be dictated by the holding of *In re Baird*, and the Patent Office would have been reversed. Because that assertion was not considered in *In re Peterson*, Harris and Wahl took the position that *In re Peterson* does not stand for the legal proposition that "when a prior art range overlaps a claimed range, those claims are *prima facie* obvious," without the need for consideration of any other facts.

It is Harris and Wahl's position that the other cases cited in the Federal Circuit decision also do not hold or even support by *dicta* the proposition of law which the Federal Circuit has established in this case, mainly that when a prior art range encompasses or overlaps a claimed range, those claims are *prima facie* obvious. *Prima facie* obviousness was either conceded, or was based on facts which are distinguishable from the facts at bar.

In *Geisler* and *Woodruff*, the only issue under consideration was whether the applicants had rebutted *prima facie* obviousness. The appropriateness of the holding of *prima facie* obviousness was not challenged. In *Malagari*, the Court did not mechanically apply p*rima facie* obviousness as a matter of law. Rather the Court in *Malagari* related the finding of *prima facie* obviousness to the ***facts*** of the case, which are very different from the facts under consideration in this case. *Malagari's* invention was identical to the prior art except for a single range that touched the preferred range.

If *In re Peterson* or any of the other cited cases are construed to establish a principle of law that encompassing or overlapping ranges render *prima facie* obvious any encompassed claimed ranges, notwithstanding the facts of each individual case, such cases should be overruled. There are many cases in which claimed ranges should be found *prima facie* obvious in view of prior art encompassing or overlapping ranges, as for example where claimed and prior art ranges are substantially coextensive. However, there are also cases, such as the case at bar, where the facts are such that a preponderance of the evidence does ***not*** compel a conclusion of *prima facie* obviousness. The law should be clear that *prima facie* obviousness in encompassing and overlapping range cases should, as in all other cases, be

determined on the basis of all of the facts, not on the basis of a rigidly applied rule, based on the single fact of overlap.

All of the facts are highly relevant to the obviousness inquiry because they have a direct bearing on whether those skilled in the art would be motivated to engage in extensive and undue experimentation to find an alloy encompassed by the claims. There is nothing in the prior art that would lead those of ordinary skill in the art to the narrowly defined alloy being claimed, such that those having ordinary skill in the art would reduce the expected amount of experimentation needed to obtain a satisfactory result and increase their likelihood of success by selecting a composition within the preferred ranges. Extremely broad ranges disclosed only for the purpose of establishing broad application for a casting process do not suggest any particular alloy, and do not motivate those having ordinary skill in the art to engage in extensive and extremely expensive experimentation to determine which, if any, of the alloys not encompassed by the disclosed preferences of the prior art might be useful. Instead, those having ordinary skill in the art would be motivated by a greater expectation of success to experiment with alloys encompassed by the preferences disclosed in the prior art.

These highly relevant facts very strongly suggest that those having ordinary skill in the art would not be motivated to select a chromium and tantalum content as claimed, but instead would be led toward other alloys which can be successfully prepared with less experimentation. Such facts should not be disregarded.

It is patently unjust that the established criteria for determining obviousness, including factual considerations that would lead the person of ordinary skill in the art to seek solutions different from the claimed invention, should be

abandoned in favor of a mechanically applied rule, only for the sake of simplifying the review process. The Federal Circuit has created a new rule of law contrary to its own precedent and contrary to this Court's landmark holding in *Graham v. John Deere*, which requires consideration of all facts relevant to obviousness, including motivation and expectation of success. This rule will make it difficult or impossible to obtain a patent on an improved alloy in the metallurgical arts or on improved compositions in the chemical arts, in which the relevant parameters were generally known, regardless of how elusive the improvement was to those having ordinary skill in the art. This will ultimately discourage research and development in such arts.

VIII. Case Law Should Not Make It Impossible To Demonstrate Surprising And Unexpected Results In Overlapping Range Cases

As evidence of surprising and unexpected results, Harris and Wahl show in tests set forth in their patent application a 32-43% increase in stress-rupture life as compared to the prior art CMSLC186® alloy, which the patent examiner had conceded were "excellent results." The Federal Circuit decision disregards this evidence because the claimed CMSX®-486 alloy used to establish these surprising results, of course, fall within the broad range of Yoshinari. According to Federal Circuit the claimed CMSX®-486 alloy is as representative of the prior art as the comparative alloy selected by Applicant, and therefore cannot possibly be said to establish results unexpectedly superior over the prior art.

This logic makes it impossible for any Applicant claiming overlapped or encompassed ranges to establish unexpected results. This is directly contrary to other cases which hold that where a claimed species of compounds demonstrates

surprising and unexpected results relative to the closest prior art actual compound in an encompassing genus, the claimed species are patentable notwithstanding the fact that they may be *prima facie* obvious under the facts of a given case. *In re Woodruff*, supra; *In re Geisler*, supra. The present Federal Circuit decision overrules well-established law regarding unexpected results, traditionally regarded as indicia of nonobviousness, in encompassing and overlapping range cases, and thus establishes a devastating legal precedent which should not be allowed to stand.

IX. Conclusion

The Federal Circuit decision establishes a "double whammy" against any patent applicant attempting to patent the fruits of research and development in nickel super alloys. First it renders almost any such alloy *prima facie* obvious, since almost any such alloy will be encompassed by the huge and speculative genus disclosed by Yoshinari. Then it makes it impossible for the Applicant to fulfill its burden of proving surprising and unexpected results by holding that the claimed range, which of course falls within the encompassing range, is as representative of the prior art as it is of the claimed invention! It is respectfully submitted that such precedent should not be allowed to stand. Grant of this petition is respectfully requested.

James A. Mitchell, Reg. No. 25120
Counsel of Record
Price, Heneveld, Cooper,
DeWitt & Litton LLP
695 Kenmoor, S.E.
Post Office Box 2567
Grand Rapids, Michigan 49501
(616) 949-9610

APPENDIX A

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

04-1370

[Filed May 25, 2005]

IN RE KENNETH HARRIS)
and)
JACQUELINE B. WAHL)
)

Appealed from the
United States Patent and Trademark Office,
Trademark Trial and Appeal Board
(Serial No. 09/797,326)

Before CLEVENGER, Circuit Judge, FRIEDMAN, Senior Circuit Judge, and RADER, Circuit Judge.

OPINION

RADER, Circuit Judge.

The United States Patent and Trademark Office (PTO) Board of Patent Appeals and Inferences (Board) affirmed the PTO's rejection of claims 1-20 of Kenneth Harris and Jacqueline B. Wahl's (collectively Harris) U.S. Patent Application 09/797,326 ('326 Application) as obvious under

35 U.S.C. § 103. *Ex Parte Harris*, Appeal No. 2003-1930, Paper No. 16 (B. P.A.I. Sept. 26, 2003) (Paper No. 16). The Board found a prima facie case of obviousness because the claimed ranges overlapped the ranges disclosed in U.S. Patent No. 5,611,670 (issued Mar. 18, 1997) (Yoshinari) and found Harris's rebuttal evidence unpersuasive. Because substantial evidence supports the Board's factual findings and the Board's conclusion of obviousness was correct, this court affirms.

I.

On March 1, 2001, Harris filed the '326 Application claiming a nickel-based superalloy for turbine engine blades that experience high temperatures. The alloy disclosed in the '326 Application contains nickel, plus twelve additional elements defined by a range of weight percentages. Representative claim 1 reads:

> A nickel-base superalloy comprising, in percentages by weight, from about 4.3% to about 5.3% Chromium (Cr), from about 9.0% to about 10% Cobalt (Co), from about 0.6% to about 0.8% molybdenum (Mo), from about 8.4% to about 8.8% tungsten (W), from about 4.3% to about 4.8% tantalum (Ta), from about 0.6% to about 0.8% titanium (Ti), from about 5.6% to about 5.8% aluminum (Al), from about 2.8% to about 3.1% rhenium (Re), from about 0.9% to about 1.5% hafnium (Hf), from about 0.06% to about 0.08% carbon (C), from about 0.012% to about 0.020% boron (B), from about 0.004% to about 0.010% zirconium (Zr), the balance being nickel and incidental impurities.

The '326 Application discloses a single embodiment of the claimed alloy—CMSX®—486. The '326 Application's

specification indicates that CMSX®-486 has improved stress-rupture properties over other alloys. The PTO made alternative rejections of representative claim 1 as being prima facie obvious in view of Yoshinari or U.S. Patent No. 5,069,873 (issued Dec. 3, 1991) (the '873 patent).[1]

The PTO rejected all pending claims in an Office Action dated August 7, 2002. The Board affirmed. Paper No. 16. The Board granted Harris's request for reconsideration but made no changes to the original decision. *Ex Parte Harris*, Appeal No. 2003-1930, Paper No. 18 (B.P.A.I. Feb. 4, 2004). Harris now appeals to this court. This court has jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

II.

The ultimate determination of obviousness under 35 U.S.C. § 103 is a legal conclusion based on underlying findings of fact. *In re Kotzab*, 217 F.3d 1365, 1369 (Fed. Cir. 2000). This court reviews the Board's legal conclusion of obviousness de novo and its underlying factual determinations for substantial evidence. *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). Whether an invention has produced unexpected results and whether a reference teaches away from a claimed invention are questions of fact. *In re Mayne*, 104 F.3d 1339, 1343 (Fed. Cir. 1997) (unexpected results); *Para-Ordnance Mfg. v. SGS Importers Int'l*, 73 F.3d

---

[1] The Patent and Trademark Office rejected claims 1-15 and 17-20 in light of Yoshinari, claim 16 in light of Yoshinari and U.S. Patent No. 6,074,602 (issued June 13, 2000) (Wukusick), and claims 1-10 in light of the '873 patent. Because this court affirms based on Yoshinari, it does not address the Board's alter native rejection based on the '873 patent. Harris did not appeal the rejection of claim 16.

1085, 1088 (Fed. Cir. 1995) (teaching away). Under the substantial evidence standard, this court affirms the Board's factual determinations if they are based upon "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *Gartside*, 203 F.3d at 1312 (quoting *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 217, 59 S. Ct. 206, 83 L. Ed. 126 (1938)).

The PTO has the burden of showing a prima facie case of obviousness. *Mayne*, 104 F.3d at 1341. In this type of claim, a prima facie case of obviousness arises when the ranges of a claimed composition overlap the ranges disclosed in the prior art. *See In re Peterson*, 315 F.3d 1325, 1329 (Fed. Cir. 2003); *In re Geisler*, 116 F.3d 1465, 1469 (Fed. Cir. 1997); *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990); *In re Malagari*, 499 F.2d 1297, 1303 (CCP A 1974). Where the "claimed ranges are completely encompassed by the prior art, the conclusion [that the claims are prima facie obvious] is even more compelling than in cases of mere overlap." *Peterson*, 315 F.3d at 1330. Even without complete overlap of the claimed range and the prior art range, a minor difference shows a prima facie case of obviousness. *Haynes Int'l v. Jessop Steel Co.*, 8 F.3d 1573, 1577 n.3 (Fed. Cir. 1993).

In this case, the Board found a prima facie case of obviousness because the ranges of the invention of Yoshinari overlap the ranges of representative claim 1. Paper No. 16, slip. op. at 7. As shown in the table below, not only do Yoshinari's disclosed ranges overlap all twelve of the '326 Application's claimed ranges, but eleven of Yoshinari's disclosed ranges completely encompass Harris's claimed ranges. Only Yoshinari's chromium range (5.0 - 14.0) does not completely encompass the '326 Application's chromium range (4.3 - 5.3) (in percentages by weight).

Element	Claimed Range	Yoshinari
Chromium (Cr)	about 4.3 - about 5.3	5.0 - 14.0
Cobalt (Co)	about 9 - about 10	Up to 10.0
Molybdenum (Mo)	about 0.6 - about 0.8	Up to 6.0
Tungsten (W)	about 8.4 - about 8.8	2.0 - 15.0
Tantalum (Ta)	about 4.3 - about 4.8	Up to 12.0
Titanium (Ti)	about 0.6 - about 0.8	0.5 - 5.0
Aluminum (Al)	about 5.6 - about 5.8	4.0 - 7.0
Rhenium (Re)	about 2.8 - about 3.1	Up to 4.0
Hafnium (Hf)	about 0.9 - about 1.5	Up to 2.0
Carbon (C)	about 0.06 - about 0.08	0.005 - 0.20
Boron (B)	about 0.012 - about 0.020	Up to 0.035
Zircomium (Zr)	about 0.004 - about 0.010	Up to 0.035
Nickel (Ni)	Balance	Balance, 58% or more

Yoshinari, col. 8, I. 20 – col. 9, I. 16. In addition, even the narrower ranges taught by Yoshinari's preferred embodiments and examples overlap eleven of the twelve claimed ranges. Again, the chromium ranges disclosed in Yoshinari's preferred embodiment (5.5 - 9.0) and one of its examples (5.5 - 7.0) do not overlap the '326 Application's chromium range (4.3 - 5.3).

See Fold Out Exhibit

CHART

Yoshinari, col. 8, l. 20 – col. 9, l. 16; col. 10, ll. 13-19. The Board explained that from the description of Yoshinari

> a person of ordinary skill in the art would have reasonably expected that the chromium content affects the hot corrosion resistance of the superalloy and cobalt conten' affects the hot corrosion resistance and the high temperature strength of the superalloy. Thus, a person of ordinary skill in the art would have recognized the suitability of adjusting the content of the disclosed elements within the disclosed ranges.

Paper No. 16, slip. op. at 7.

Harris points to *Peterson* to advance his position that Yoshinari's ranges are too broad to teach any specific alloy to the skilled artisan. *Peterson* discussed that a disclosed range might become too broad to teach a subset range. 315 F.3d at 1330 n. 1. A review of *Peterson* informs the court that this case does not present such a problem. In *Peterson*, the applicant claimed a single-crystal, nickel-base superalloy comprising nickel and ten additional elements. *Id.* at 1327. Eight of the ten ranges disclosed in the *Peterson* prior art (Shah) are broader than the ranges disclosed in Yoshinari. For example, Shah's range for cobalt (0-20) is twice the range allowed by Yoshinari (0-10). *Id.* at 1329. Shah also includes two elements (carbon and boron) that have no upper limits. *Id.* In contrast, Yoshinari bounds each element to a specific range, and limits the extent of those ranges by requiring at least 58% nickel. Yoshinari, col. 8, l. 20 –col. 9, l. 16; col. 10, ll. 13-19. Thus, the prior art in *Peterson* was broader than in this case.

In addition, *Peterson*'s claimed ranges were narrower than those claimed in this case. Seven of the ten alloys claimed in

Peterson were defined by a specific value. 315 F.3d at 1329 (e.g. claiming "about 14% "chromium and "about 9.5% cobalt"). In contrast, all twelve elements in this case vary over ranges that extend up to a full percentage point. '326 Application, col. 7, claim 1. Thus, this court determines the Board correctly concluded that representative claim 1 is prima facie obvious in view of Yoshinari because the ranges of the invention of Yoshinari sufficiently overlap the ranges of representative claim 1.

When the PTO shows prima facie obviousness, the burden then shifts to the applicant to rebut. *In re Dillon*, 919 F.2d 688, 692 (Fed. Cir. 1990) (en banc). Rebuttal may take the form of "a comparison of test data showing that the claimed compositions possess unexpectedly improved properties ... that the prior art does not have, that the prior art is so deficient that there is no motivation to make what might otherwise appear to be obvious changes, or any other argument . . . that is pertinent." *Id.* at 692-93 (citations omitted).

Harris argues that Yoshinari teaches away from the claimed range of the invention. In support of this contention, Harris argues that nothing in the Yoshinari patent suggests the use of less chromium and more tantalum, namely the claimed ranges of about 4.3% to 5.3% chromium and about 4.3% to 4.8% tantalum. To the contrary, Yoshinari's Example 2 teaches as uperalloy having tantalum content from "3.0 to 7.0" percent, which completely encompasses the claimed range of tantalum. Yoshinari, col. 10, II. 13-19. In addition, Yoshinari teaches that 5-14 weight percent is an "appropriate additive amount" of chromium. Id. at col. 8, II. 33-37. Thus, Yoshinari teaches that a portion of the claimed range (e.g., 5.0-5.3) is "appropriate." Finally, the '326 Application's use of the term "about" shows that the applicants did not intend

to limit the claimed ranges to their exact end-points. *See Jeneric/Pentron, Inc. v. Dillon Co.* 205 F.3d 1377, 1381 (Fed. Cir. 2000). Thus, contrary to Harris's contention, Yoshinari's preferred range of 5.5 to 7.0 is not necessarily outside the scope of "about 5.3." Therefore, this court finds substantial evidence supports the Board's finding that Yoshinari does not teach away.

With respect to unexpected results, the Board concluded that Harris had not shown that any results were unexpected. Paper No. 16, slip. op. at 11-12. As evidence of unexpected results, Harris compares CMSX®-486, an alloy centrally located within claim 1's range, to four commercial alloys, namely CM247LC, CMSX-3, CM186LC and CMSX-681. All are prior art except CMSX-681. When compared to CM186LC, CMSX®-486 shows 32% to 43% improvement in stress rupture life. Harris argues CM186LC is the closest prior art because it differs from the claimed invention only in that it has 6.0% chromium rather than about 4.3% to 5.3%, and 3.4% tantalum rather than about 4.3% to 4.8%. While the results were not as favorable when compared against CMSX-3, Harris argues CMSX®-486 can be produced at considerable cost savings as compared with single crystal castings of CMSX-3 because of fewer rejectable grain defects.

The 32-43% increase in stress-rupture life, however, does not represent a "difference in kind" that is required to show unexpected results. *See In re Huang*, 100 F.3d 135, 139 (Fed. Cir. 1996) (holding that claimed ranges must "produce a new and unexpected result which is different in kind and not merely in degree from results of the prior art"). In addition, Yoshinari teaches that limiting the percentages of chromium and tantalum will improve the "hot corrosion resistance" and "high-temperature strength" of the alloy. Yoshinari, col. 8, ll. 33-37, 44-51. As these factors are related to the stress-

Element	Claimed Range	Yoshinari Preferred	Yoshinari Ex. 1	Yoshinari Ex. 2
Cr	about 4.3 - about 5.3	**5.5 - 9.0**	**5.5 - 7.0**	5.0 - 14.0
Co	about 9 - about 10	9 -10.5	9 - 9.5	0 - 12.0
Mo	about 0.6 - about 0.8	0.3 – 1	0.3 - 0.7	0.5 - 3.0
W	about 8.4 - about 8.8	8 – 11	8 - 9	5.0 -12.0
Ta	about 4.3 - about 4.8	3 – 4	3 - 4	3.0 -7.0
Ti	about 0.6 - about 0.8	0.5 – 1	0.5 - 0.9	0.5 - 3.0
Al	about 5.6 - about 5.8	5 – 6	5.5 - 6.0	4.0 - 6.0
Re	about 2.8 - about 3.1	2.5 - 3.5	2.8 - 3.1	0 - 3.5
Hf	about 0.9 - about 1.5	0.5 – 1	0.7 - 1.0	0 - 2.0
C	about 0.06 - about 0.08	0.03 - 0.1	0.05 - 0.1	Formula
B	about 0.012 - about 0.020	0.005 - 0.25	0.005 - 0.01	Formula
Zr	about 0.004 - about 0.010	0.005 - 0.25	0.005 - 0.01	Formula
Nb	None	0.2-3	None	None
Ni	Balance	>58%	>58%	>58%

rupture life of the alloy, substantial evidence supports the Board's conclusion that the increase in stress-rupture life is not unexpected.

The Board also correctly reasoned that the showing of unexpected results is not commensurate in scope with the degree of protection sought by the claimed subject matter because the elemental composition of CMSX®-486 is at or near the midpoint of the claimed range. While Harris's evidence may show a slight improvement over some alloys, the record does not show that the improved performance would result if the weight-percentages were varied within the claimed ranges. Even assuming that the results were unexpected, Harris needed to show results covering the scope of the claimed range. Alternatively Harris needed to narrow the claims.

Finally, substantial evidence supports the Board's finding that Harris did not compare an embodiment representative of the claimed range to an embodiment of the closest prior art. Paper No. 16, slip. op. at 11-12. As stated above, Harris contends CM186LC is the embodiment closest to the prior art. However, because both CM186LC and CMSX®-486 have at least one element that is within Yoshinari's general range, but outside a preferred range, CM186LC is no closer to the prior art than is CMSX®-486. In other words, CMSX®-486, the embodiment allegedly exhibiting unexpected results, is as equally representative of the prior art as is CM186LC. Whereas each embodiment is equally representative of the prior art, a comparison of those two embodiments cannot be said to establish that one embodiment has results unexpectedly superior over the prior art.

III

In sum, this court affirms the Board's finding of a prima facie case of obviousness because the ranges claimed in the '326 Application's overlapped the ranges disclosed in Yoshinari. This court also sustains the Board's finding that Harris's rebuttal evidence was unpersuasive.

COSTS

Each party shall bear its own costs.

AFFIRMED

APPENDIX B

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

04-1370

[Filed June 30, 2005]

IN RE KENNETH HARRIS)
and)
JACQUELINE B. WAHL)
)

ORDER

A petition for rehearing en banc having been filed by the APPELLANTS, and the matter having first been referred as a petition for rehearing to the panel that heard the appeal, and thereafter the petition for rehearing en banc having been referred to the circuit judges who are in regular active service,

UPON CONSIDERATION THEREOF, it is

ORDERED that the petition for rehearing be, and the same hereby is, DENIED and it is further

ORDERED that the petition for rehearing en banc be, and the same hereby is, DENIED.

The mandate of the court will issue on July 18, 2005.

FOR THE COURT,

/s/ _____
Jan Horbaly
Clerk

Dated: June 30, 2995

APPENDIX C

Paper No. 16

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appeal No. 2003-1930 Application No. 09/797,326

[Filed September 26, 2003]

Ex parte KENNETH HARRIS	)
and	)
JACQUELINE B. WAHL	)
	)

Before OWENS, DELMENDO and JEFFREY T. SMITH, Administrative Patent Judges.

DECISION ON APPEAL

Applicants appeal the decision of the Primary Examiner finally rejecting claims 1, to 20, all of the claims in the application.[1] We have jurisdiction under 35 U.S.C. § 134.

BACKGROUND

The subject matter of Appellants' invention relates to a nickel base superalloy. According to Appellants, Brief page 2, the claimed invention exhibits "outstanding high temperature stress-rupture properties, creep-rupture properties and reduced rejectable grain defects as compared with conventional directionally solidified columnar grain casting alloys and single crystal alloys." Claim 1, which is representative of the claimed invention, appears below:

> 1. A nickel-base superalloy comprising, in percentages by weight, from about 4.3% to about 5.3% chromium, (Cr), from about 9.0% to about 10.0% cobalt (Co), from about 0.6% to about 0.8% molybdenum (Mo), from about 8.4% to about 8.8% tungsten (W), from about 4.3% to about 4.8% tantalum (Ta), from about 0.6% to about 0.8% titanium (Ti), from about 5.6% to about 5.8% aluminum (Al), from about 2.8% to about 3.1% rhenium (Re), from about 0.9% to about 1.5% hafnium (Hf), from about 0.06% to about 0.08% carbon (C), from about 0.012% to about 0.020% boron (B), from about 0.004% to about 0.010%

---

[1] In rendering our decision, we have considered Appellants' arguments presented in the Brief, filed February 10, 2003, and the Reply Brief, filed May 22, 2003.

zirconium (Zr), the balance being nickel and incidental impurities.

CITED PRIOR ART

As evidence of unpatentability, the Examiner relies on the following references:

Harris et al. (Harris)	5,069,873	Dec. 03, 1991
Yoshinari et al. (Yoshinari)	5,611,670	Mar. 18, 1997
Wukusick et al (Wukusick)	6,074,602	Jun. 13, 2000

The Examiner has rejected claims 1 to 15 and 17 to 20 as unpatentable under 35 U.S.C. § 103(a) as obvious over Yoshinari; claim 16 as unpatentable under 35 U.S.C. § 103(a) as obvious over Yoshinari as applied to claim 1 and combined with Wukusick; and claims 1 to 10 as unpatentable under 35 U.S.C. § 103(a) as obvious over Harris. (Answer, pp. 3 to 7).

DISCUSSION

Rather than reiterate the conflicting viewpoints advanced by the Examiner and Appellants concerning the above-noted rejections, we refer to the Answer and the Briefs.

Appellants state "[f]or purposes of Appeal only, all claims

will stand or fall together." (Brief, p. 3).[2] We interpret this statement to mean that for each ground of rejection the claims stand or fall together. We will select one claim for each rejection to determine the issues on appeal. 37 CFR § 1.192(c)(7) and (8) (2001).

The Examiner has concluded that the teachings of Yoshinari render the invention of claims 1 to 15 and 17 to 20 *prima facie* obvious. (Answer, pp. 3 to 5). We affirm. We select claim 1 as representative of the rejected claims.

Yoshinari describes a nickel base superalloy. According to the Examiner, the ranges of Yoshinari's Cr and Co overlap the subject matter of claim 1. (Answer, p. 4). Yoshinari discloses that the cobalt and chromium content affects the hot corrosion resistance of the superalloy. Cobalt also affects the high temperature strength of the superalloy. (Col. 8). Yoshinari also provides a description of the remaining components and their properties in columns 8 and 9. The Examiner determined that the claimed invention would have been obvious to a person of ordinary skill in the art. (Answer, p. 4).[3]

---

[2] The Examiner disagrees with Appellants' grouping of the claims. (Answer, p. 2). The Examiner asserts that claims 11 to 16 should represent a second group. However, neither of Appellants' Briefs contain separate arguments for claims 11 to 16.

[3]

	CLAIMED INVENTION	Yoshinari '670 column 3
	weight percent	weight percent
Cr	about 4.3 to about 5.3	5 to 14
Co	about 9.0 to about 10 0	up to 10
Mo	about 0.6 to about 0.8	up to 6
W	about 8.4 to about 8.8	2 to 15

The following description of the elements included in the Ni-base superalloys appears in columns 8 and 9 of Yoshinari:

Carbon dissolves in matrix or grain boundaries in particular and forms carbides to improve high-temperature tensile strength. However, if it is added excessively, the melting point of grain boundaries is lowered, thereby deteriorating high-temperature strength and toughness. Consequently, an appropriate additive amount of carbon is in a range of 0.05 to 0.2%, preferably 0.03 to 0.1%.

Co dissolves in matrix to improve high temperature strength and also contributes to improvement of hot corrosion resistance. If it is added excessively, it promotes precipitation of harmful intermetallic compounds, thereby deteriorating high-temperature strength. An appropriate additive amount of Co is 10.5% or less, preferably 9 to 10.5%.

Cr improves hot corrosion resistance. However, if it is added excessively, it causes precipitation of harmful

---

Ta	about 4.3 to about 4.8	up to 12
Ti	about 0.6 to about 0.8	0.5 to 5
Al	about 5.6 to about 5.8	4 to 7
Re	about 2.8 to about 3.1	up to 4
Hf	about 0.9 to about 1.5	up to 2
C	about 0.06 to about 0.08	up to 0.20
B	about 0.012 to about 0.020	up to 0.035
Zr	about 0.004 to about 0.010	up to 0.035
Nb	n/a	up to 3
Ni	balance	balance 58%

σ-phase and coarsening of carbides, thereby deteriorating high-temperature strength. An appropriate additive amount of Cr is in a range of 5 to 14%, preferably 5.5 to 9%.

Al and Ti contribute to improvement of high-temperature strength by forming γ'-phase, i.e., Ni_3 (Al, Ti), which is a strengthening factor of the Ni-base alloy. Appropriate additive amounts of Al and Ti are, respectively, in ranges of 4.0 to 7.0% and 0.5 to 5.0%, and preferably 5 to 6% of Al and 0.5 to 1.0 % of Ti.

Nb, Ta and Hf dissolve in γ'-phase which is a strengthening factor, and improve high-temperature strength of the alloy. However, if they are added excessively, they segregate at grain boundaries and reduce the strength of the alloy. Appropriate additive amounts of Nb, Ta and Hf are, respectively, 3% or less, 12% or less and 2% or less, and preferably 0.2 to 3.0% of Nb, 3 to 4% of Ta and 0.5 to 1.0% of Hf.

Zr and boron (B) strengthen grain boundaries and improve high-temperature strength of the alloy. However, if Zr and boron (B) are added excessively, ductility and toughness are reduced, and the melting point of grain boundaries is lowered, thereby deteriorating high temperature strength of the alloy. Appropriate additive amounts of Zr and B are, respectively, up to 0.035% and up to 0.035%. Preferably, considering the relationship with carbon content, they should be within a range defined by A (C=0.20%, B+Zr=0%), B (C=0.05%, B+Zr=0% C (C=0%, B+Zr=0.01%), D (C=0%, B+Zr=0.035%) and E (C=0.1%, B+Zr=0.025%),

or one or both of boron (B) and Zr should be 0.005 to 0.025%.

W (tungsten) and Mo dissolve in γ'-phase of the matrix and strengthen the alloy, and W and Mo are particularly effective for improving long-term strength of the alloy. However, if W and Mo are added excessively, there is a precipitation of a harmful phase such as σ-phase, thereby deteriorating strength of the alloy. Appropriate additive amounts of W and Mo are, respectively, 2 to 15% and 6.0% or less, and preferably 8.0 to 11.0% of W and 0.3 to 1.0% of Mo.

Re improves hot corrosion resistance of the alloy. However, if Re exceeds a certain amount, the effect is saturated, and ductility and the toughness of the alloy are degraded. An appropriate additive amount of Re is 4% or less, and preferably 2.5 to 3.5%. In the case where a difference of crystal orientations of the single crystal is 8 degrees or less, suitably there is no grain boundary in the Ni-base superalloy as the single crystal. If a difference of crystal orientations of columnar grains is 15 degrees or less, a satisfactory strength can be obtained as the columnar grains.

Appellants argue that "[t]he Yoshinari et al. patent does not provide motivation or guidance that would lead those having ordinary skill in the art to optimize the broad disclosure at col. 3, lines 8-12 or the Yoshinari et al. patent so as to arrive at the claimed invention." (Brief, p. 5). Appellants also argue that "[t]he closest prior art must be an actual composition that is either disclosed or suggested by the prior art, not a hypothetical composition arrived at by assuming that one having ordinary skill in the art would select from the broad disclosures of the prior art a composition that

otherwise meets the requirements of the claims but has a tantalum content of 4.0% and a chromium content of 5.5% (while containing an incidental impurity amount of niobium)." (Reply Brief, p. 6).

We disagree. A *prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art. *See In re Peterson*, 315 F.3d 1325, 1329, 65 USPQ2d 1379, 1382 (Fed. Cir. 2003); *In re Geisler*, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990); *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974). Such is the case here. As can be seen from the above description of Yoshinari, a person of ordinary skill in the art would have reasonably expected that the chromium content affects the hot corrosion resistance of the superalloy and cobalt content affects the hot corrosion resistance and the high temperature strength of the superalloy. Thus, a person of ordinary skill in the art would have recognized the suitability of adjusting the content of the disclosed elements within the disclosed ranges. Yoshinari discloses that niobium can be present in an amount of up to 3 wt%. Thus, Yoshinari discloses that niobium can be excluded from the composition. Appellants have not cited an authority that stipulates results must be a comparison of an "actual composition".

Since the ranges of claim 1 overlaps the invention of Yoshinari, the burden is shifted to Appellants to establish that the claimed invention would not have been obvious. *In re Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1383. Thus, we now turn to Appellants' evidence presented to rebut the *prima facie* case of obviousness. Appellants assert that Table 1 of the specification demonstrates that the claimed invention exhibits an unexpected improvement in high temperature

stress-rupture properties. Specifically, Appellants assert the superalloy CMSX®-486 exhibits superior results. (Brief, p. 6).

Appellants' evidence of unexpected results is not persuasive. Appellants can overcome a *prima facie* case of obviousness by establishing the claimed range achieves unexpected results relative to the prior art range. *In re Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1383 (quoting *In re Geisler*, 116 F.3d at 1469-70, 43 USPQ2d at 1365). Having reviewed the data present, we conclude that the showing in Tables 2-4 is not commensurate in scope with the degree of protection sought by the claimed subject matter.[4] Specifically, appellants have not explained why a single example is representative of the entire claimed range. Appellants have not explained why the comparative four superalloys, outside of the scope of the claimed invention, are representative of the superalloy described in the Yoshinari reference. Further, Appellants have not explained why results obtained are unexpected.

Appellants in the Reply Brief presented arguments based on the preferred embodiments of the Yoshinari reference. These arguments are not persuasive because a reference is available for all of the disclosed the embodiments, not only the preferred embodiments. *Merck & Co. Inc. v. Biocraft Labs. Inc.*, 874 F.2d 804, 807, I0 USPQ2d 1843, 1846 (Fed. Cir. 1989). ("That the [prior art reference] discloses a multitude of effective combinations does not render any particular formulation less obvious.").

The Examiner rejected claim 16 as unpatentable under 35 U.S.C. § 103(a) as obvious over Yoshinari as applied to claim 1 and combined with Wukusick. (Answer, p. 5). We affirm.

---

[4] We note that the information provided in Table 1 is a list of the components in the various superalloys. Tables 2-4 do provide comparative data for the superalloys.

In response to this rejection, the Appellants argue that "[c]laim 16 is allowable for the reasons generally set forth above with respect to claims 1-15 and 17-20, to the extent that claim 16 is dependent from claim 11."

The Examiner has presented factual determinations regarding the suggestion to combine the teachings of the Wukusick reference with Yoshinari. The Examiner's determinations are reasonable and are based on the evidence of record. Since Appellants have failed to specifically challenge the factual determinations, we presume that they are in agreement with the Examiner. Thus, for the reasons presented above regarding claim 1 and the reasons presented by the Examiner we will uphold the rejection. The Examiner rejected claims 1 to 10 as unpatentable under 35 U.S.C. § 103(a) as obvious over Harris. (Answer, pp. 5-7). We affirm. We select claim 1 as representative of the rejected claims.

Harris describes a nickel-base superalloy that is similar to the claimed invention. According to the Examiner, the ranges of Harris's Cr and Ta fail to overlap the subject matter of claim 1. However, because the claimed subject matter uses the term "about" for the describing the ranges of Cr and Ta, the Examiner determined that the claimed subject matter would have been obvious because a person of ordinary skill in the art would have expected the properties of Harris to be the same as the claimed invention. (Answer, p. 6).[5] The

---

[5]

CLAIMED INVENTION		Harris '873 table 1
	weight percent	weight percent
Cr	about 4.3 to about 5.3	5.5 to 7.0
Co	about 9.0 to about 10.0	9.0 to 9.5
Mo	about 0.6 to about 0.8	0.3 to 0.7
W	about 8.4 to about 8.8	8.0 to 9.0

Federal Circuit has held that a *prima facie* case of obviousness exists when the claimed range and the prior art range do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of Am. v. Banner*, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). (The court determined that a claim directed to an alloy containing "0.8% nickel, 0.3% molybdenum, up to 0.1% maximum iron, balance titanium" would have been *prima facie* obvious in view of a reference disclosing alloys containing 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.). In the present case, the claimed range and the Harris range for Cr and Ta do not overlap but are very close. As stated above, with regard to Yoshinari, a person of ordinary skill in the art would have recognized the suitability of adjusting the content of the elements in Ni-based superalloys. Consequently, a person of ordinary skill in the art would have recognized that Ta affects the strengthening factor of the superalloy and Cr affects the hot corrosion resistance of the superalloy. Thus, we determine that the Examiner has established a *prima facie* case of obviousness because a person of ordinary skill in the art would have reasonably recognized the results that would have been obtained by adjusting the content of Ta and Cr.

Ta	about 4.3 to about 4.8	3.0 to 4.0
Ti	about 0.6 to about 0.8	5.5 to 6.0
Al	about 5.6 to about 5.8	2.8 to 3.1
Re	about 2.8 to about 3.1	1.2 to 1.8
Hf	about 0.9 to about 1.5	1.2 to 1.8
C	about 0.06 to about 0.08	0.05 to 0.09
B	about 0.012 to about 0.020	0.01 to 0.024
Zr	about 0.004 to about 0.010	0.004 to 0.010
Ni	balance	balance

We now turn to Appellants' evidence presented to rebut the *prima facie* case of obviousness. Appellants assert the superalloy CMSX®-486 exhibit superior results compared to superalloy CM 186 LC® which is representative of the Harris invention. Appellants assert that Tables 2 to 4 of the specification demonstrate that the claimed invention exhibits an unexpected improvement in high temperature stress-rupture properties. (Brief, p. 9).

Appellants' evidence of unexpected results is not persuasive. The burden is on the Appellants to show why the comparative data establishes unexpected results. *See In re Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972). Appellants have not explained why the results obtained are unexpected. Appellants have not shown why these comparisons are believed to be representative of the closest embodiments of Harris. *See In re Burckel*, 592 F.2d 1175, 1179, 201 USPQ 67, 71 (CCPA 1979).

We find that the showing in Tables 1 to 4 does not compare the disputed subject matter. The issue present is whether the result obtained by the claimed invention would have been unexpected from the superalloy described by Harris. Appellants have not explained why the superalloy CM 186 LC® is representative of the closest embodiment of the claimed invention. Further, Appellants have not explained why the superalloy CMSX®-486 is representative of the closest embodiment of Harris. Thus, the data presented is not probative for comparison of the closest claimed embodiment to the closest prior art embodiment.

We therefore affirm the rejection of claims 1 to 10 as unpatentable under 35 U.S.C. § 103(a) as obvious over Harris.

CONCLUSION

Based on our consideration of the totality of the record before us, having evaluated the *prima facie* case of obviousness in view of Appellants' arguments and evidence, we conclude that the subject matter of claims 1 to 20 would have been obvious to a person of ordinary skill in the art from the cited prior art references.

The Examiner's rejections of claims 1 to 15 and 17 to 20 as unpatentable under 35 U.S.C. § 103(a) as obvious over Yoshinari; claim 16 as unpatentable under 35 U.S.C. § 103(a) as obvious over Yoshinari as applied to claim 1 and combined with Wukusick; and claims 1 to 10 as unpatentable under 35 U.S.C. § 103(a) as obvious over Harris are affirmed.

Time for taking action

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

/s/_____
TERRY J. OWENS
Administrative Patent Judge

/s/_____
ROMULO H. DELMENDO
Administrative Patent Judge

/s/_____
JEFFREY T. SMITH
Administrative Patent Judge

BOARD OF PATENT
APPEALS
AND
INTERFERENCES

APPENDIX D

Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appeal No. 2003-1930 Application No. 09/797,326

[Filed February 4, 2004]

Ex parte KENNETH HARRIS	)
and	)
JACQUELINE B. WAHL	)
	)

Before OWENS, DELMENDO and JEFFREY T. SMITH, Administrative Patent Judges.

ON REQUEST FOR REHEARING

Appellants have filed a paper under 37 CFR § 1.197(b) requesting that we reconsider our decision of September 26, 2003, wherein we affirmed the rejection of claims 1 to 20 under 35 U.S.C. § 103(a).[1]

[1] The request for rehearing was filed November 26, 2003.

37 CFR § 1.197(b) (1997) provides as follows:

> Appellant may file a single request for rehearing within two months from the date of the original decision, unless the original decision is so modified by the decision on rehearing as to become, in effect, a new decision, and the Board of Patent Appeals and Interferences so states. The request for rehearing must state with particularity the points believed to have been misapprehended or overlooked in rendering the decision and also state all other grounds upon which rehearing is sought. See § 1.136(b) for extensions of time for seeking rehearing in a patent application and § 1.550(c) for extensions of time for seeking rehearing in a reexamination proceeding.

We have reconsidered our decision of September 26, 2003 in light of Appellants' comments in the request for rehearing, and we find no error therein. We, therefore, decline to make any changes in our prior decision for the reasons which follow.

Appellants assert that "[t]he Board did not understand that Appellants have provided evidence demonstrating an unexpected result." (Rehearing request, p. 1). We disagree. As indicated at page 8 of our decision, "Appellants can over come a *prima facie* case of obviousness by establishing the claimed range achieves unexpected results relative to the prior art range." *See In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). ("The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. *See, e.g., Gardner v. TEC Sys., Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir.), cert. denied, 469 U.S. 830 [225 USPQ 232] (1984); *In re Boesch*, 617 F.2d

272, 205 USPQ 215 (CCPA 1980); *In re Ornitz*, 351 F.2d 1013, 147 USPQ 283 (CCPA 1965); *In re Aller*, 220 F.2d 454, 105 USPQ 233 (CCPA 1955). These cases have consistently held that in such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.")

In the present case the Appellants have relied on a single example, that falls within the disclosure of the claimed invention, to establish the allegedly unexpected results. Appellants assert the comparison to the alloy CM 186 LC® is within the preferred ranges of Yoshinari. (Rehearing request, p. 2). However we note that the CMSX®-486 alloy falls within the broad disclosure of Yoshinari.[2] According to Appellants, Rehearing request page 2, the alloys CM 186 LC® and CMSX®-486 are compositionally similar except for the amount of chromium and tantalum. Appellants have not explained why alloy CMSX®-486 is representative of the claimed invention and not of the Yoshinari reference. Appellants have also not adequately explained why alloy CMSX®-486 is commensurate in scope with the range of alloys encompassed by the claimed subject matter. *See In re Boesch*, 617 F.2d at 276, 205 USPQ at 219. The establishing of the significance of the claimed range is especially relevant in this appeal where Yoshinari discloses alloy components in ranges encompassing the claimed alloy component ranges.

---

[2] "[I]n a section 103 inquiry, 'the fact that a specific [embodiment] is taught to be preferred is not controlling, since all disclosures of the prior art, including unpreferred embodiments, must be considered.'" *Merck & Co. Inc. v. Biocraft Laboratories Inc.*, 874 F.2d 804, 807, 10 USPQ2d 1843, 1846 (Fed. Cir. 1989) (*quoting In re Lamberti*, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976)).

The alloy CMSX®-486 is limited to only one composition however, the claims are not so limited.

Appellants also have not shown why the alloy CM 186 LC®, alleged to be representative of the Yoshinari reference, is believed to be the closest prior art. *See In re Burckel*, 592 F.2d 1175, 1179, 201 USPQ 67, 71 (CCPA 1979). We note that Appellants, Rehearing request page 2, have indicated that the comparative alloy CM 186 LC® has been optimized for high temperature strength. However, Appellants have not indicated that this is the same procedure required by Yoshinari. Nonetheless, the results sought to be proven by the various alloys discussed in the specification are lost since the alloy CMSX®-486 falls within the scope of the disclosure of Yoshinari.

Appellants assert the affirmation of the rejection based on Harris is improper because the rejection is based exclusively on Harris. Specifically, Appellants are questioning our determination that "a person of ordinary skill in the art would have reasonably recognized the results that would have been obtained by adjusting the content of Ta and Cr." (Rehearing request, p. 4). We are not persuaded by Appellants' argument. In an obviousness determination it is not improper to refer to extrinsic evidence, such as references or declarations. Extrinsic evidence may be considered when it is used to explain, but not expand, the meaning of a reference. *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565, 1576-77, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991). Here, the reference to the Yoshinari reference was to establish that persons of ordinary skill in the art would have recognized the result that would have been obtained by adjusting the amount of chromium and tantalum in a nickel based alloy.

Appellants provide additional argument directed to the significance of the data in the specification. (Rehearing request pp. 4-5). These additional arguments are not persuasive for the reasons stated above and in our prior decision.

We have granted Appellants' request to the extent that we have reconsidered our decision of September 26, 2003, but we deny the request with respect to making any changes therein.

Time for taking action

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

REHEARING DENIED

/s/ _____
TERRY J. OWENS
Administrative Patent Judge

/s/ _____
ROMULO H. DELMENDO
Administrative Patent Judge

/s/ _____
JEFFREY T. SMITH
Administrative Patent Judge

BOARD OF PATENT
APPEALS
AND
INTERFERENCES

APPENDIX E

CLAIMS REJECTED IN EX PARTE APPEAL

1. A nickel-base superalloy comprising, in percentages by weight, from about 4.3% to about 5.3% chromium, (Cr), from about 9.0% to about 10.0% cobalt (Co), from about 0.6% to about 0.8% molybdenum (Mo), from about 8.4% to about 8.8% tungsten (W), from about 4.3% to about 4.8% tantalum (Ta), from about 0.6% to about 0.8% titanium (Ti), from about 5.6% to about 5.8% aluminum (Al), from about 2.8% to about 3.1% rhenium (Re), from about 0.9% to about 1.5% hafnium (Hf), from about 0.06% to about 0.08% carbon (C), from about 0.012% to about 0.020% boron (B), from about 0.004% to about 0.010% zirconium (Zr), the balance being nickel and incidental impurities.

2. The nickel-base superalloy of claim 1, wherein the chromium is present in an amount of from about 4.5% to about 5.1% by weight.

3. The nickel-base superalloy of claim 1, wherein the hafnium is present in an amount from about 0.9% to about 1.3% by weight.

4. The nickel-base superalloy of claim 1, wherein the tantalum is present in an amount of from about 4.4% to about 4.7% by weight.

5. The nickel-base superalloy of claim 1, wherein the chromium is present in an amount of from about 4.5% to

about 5.1% by weight, and the hafnium is present in an amount from about 0.9% to about 1.3% by weight.

6. The nickel-base superalloy of claim 1, wherein the chromium is present in an amount of from about 4.5% to about 5.1% by weight, and the tantalum is present in an amount from about 4.4% to about 4.7% by weight.

7. The nickel-base superalloy of claim 1, wherein the hafnium is present in an amount of from about 0.9% to about 1.3% by weight, and the tantalum is present in an amount from about 4.4% to about 4.7% by weight.

8. The nickel-base superalloy of claim 1, wherein the chromium is present in an amount of from about 4.5% to about 5.1% by weight, the hafnium is present in an amount from about 0.9% to about 1.3% by weight, and the tantalum is present in an amount from about 4.4% to about 4.7% by weight.

9. The nickel-base superalloy of claim 1, wherein the total content of tungsten, rhenium, tantalum and molybdenum is from about 16.4% to about 17.0% by weight.

10. The nickel-base superalloy of claim 1 comprising, in percentages by weight, about 5% chromium, about 9.3% cobalt, about 0.7% molybdenum, about 8.6% tungsten, about 4.5% tantalum, about 0.7% titanium, about 5.7% aluminum, about 2.9% rhenium, about 1.0% hafnium, about 0.07% carbon, about 0.015% boron, about 0.005% zirconium, the balance being nickel and incident impurities.

11. A single crystal casting prepared from a nickel-base superalloy comprising, in percentage by weight, from about 4.3% to about 5.3% chromium, (Cr), from about 9.0% to

about 10.0% cobalt (Co), from about 0.6% to about 0.8% molybdenum (Mo), from about 8.4% to about 8.8% tungsten (W), from about 4.3% to about 4.8% tantalum (Ta), from about 0.6% to about 0.8% titanium (Ti), from about 5.6% to about 5.8% aluminum (Al), from about 2.8% to about 3.1% rhenium (Re), from about 0.9% to about 1.5% hafnium (Hf), from about 0.06% to about 0.08% carbon (C), from about 0.012% to about 0.020% boron (B), from about 0.004% to about 0.010% zirconium (Zr), the balance being nickel and incidental impurities.

12. The single crystal casting of claim 11, wherein the chromium is present in an amount of from about 4.5% to about 5.1% by weight.

13. The single crystal casting of claim 11, wherein the hafnium is present in an amount of from about 0.9% to about 1.3% by weight.

14. The single crystal casting of claim 11, wherein the tantalum is present in an amount of from about 4.4% to about 4.7% by weight.

15. The single crystal casting of claim 11, wherein the total content of tungsten, rhenium, tantalum and molybdenum is from about 16.4% to about 17.0% by weight.

16. The single crystal casting of claim 11, where 10-50 ppm La, Y, Ce individually or in combination is present to improve bare oxidation resistance and coating performance.

17. A nickel-base turbine vane, turbine blade, or multiple turbine vane segment cast from a nickel-base superalloy comprising, in percentage by weight, from about 4.3% to about 5.3% chromium, (Cr), from about 9.0% to about

10.0% cobalt (Co), from about 0.6% to about 0.8% molybdenum (Mo), from about 8.4% to about 8.8% tungsten (W), from about 4.3% to about 4.8% tantalum (Ta), from about 0.6% to about 0.8% titanium (Ti), from about 5.6% to about 5.8% aluminum (Al), from about 2.8% to about 3.1% rhenium (Re), from about 0.9% to about 1.5% hafnium (Hf), from about 0.06% to about 0.08% carbon (C), from about 0.012% to about 0.020% boron (B), from about 0.004% to about 0.010% zirconium (Zr), the balance being nickel and incidental impurities.

18. The turbine vane, turbine blade, or multiple turbine vane segment of claim 17, wherein the chromium is present in an amount of from about 4.5% to about 5.1% by weight.

19. The turbine vane, turbine blade, or multiple turbine vane segment of claim 17, wherein the hafnium is present in an amount from about 0.9% to about 1.3% by weight.

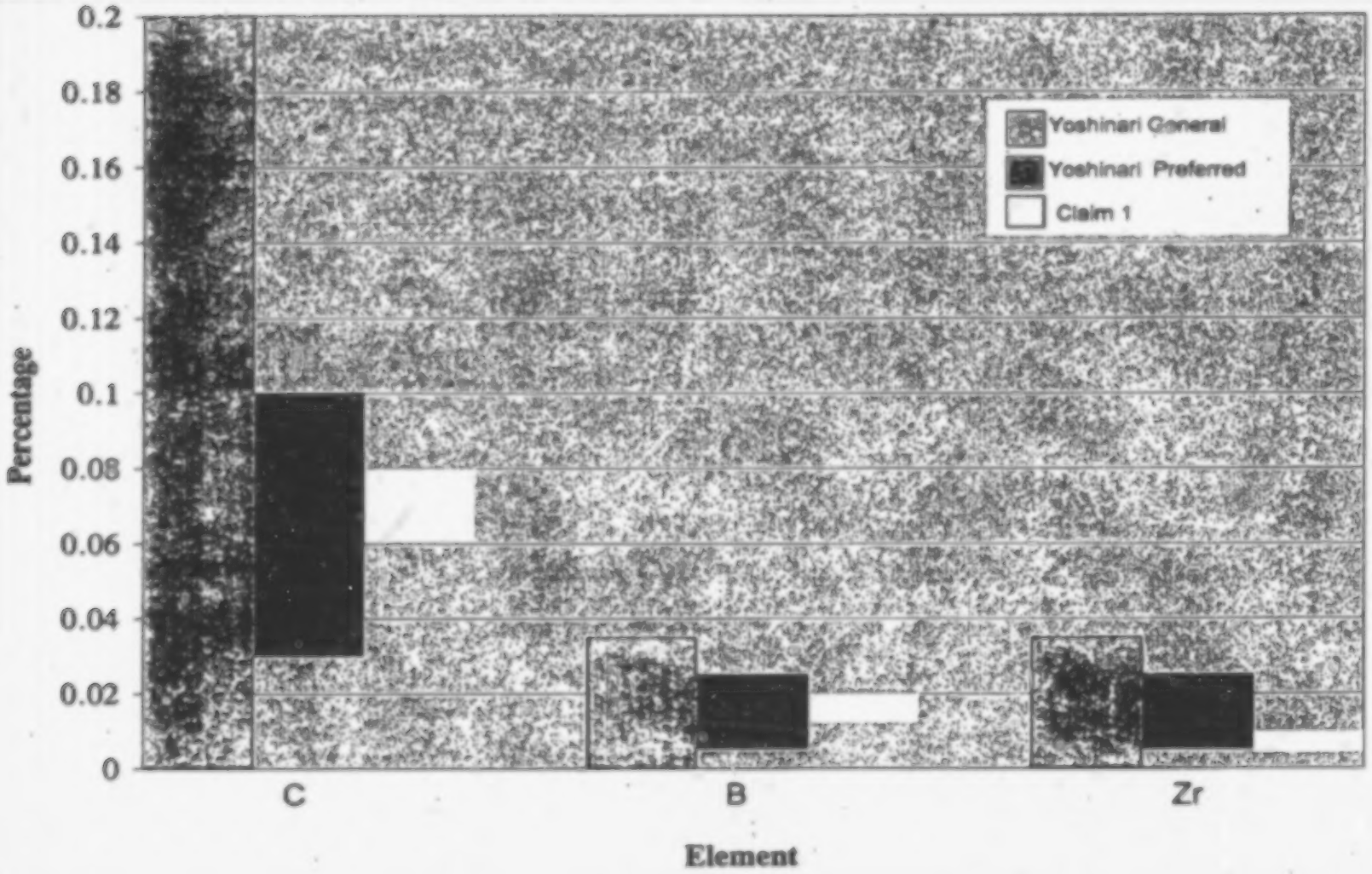
20. The turbine vane, turbine blade, or multiple turbine vane segment of claim 17, wherein the tantalum is present in an amount of from about 4.4% to about 4.7% by weight.

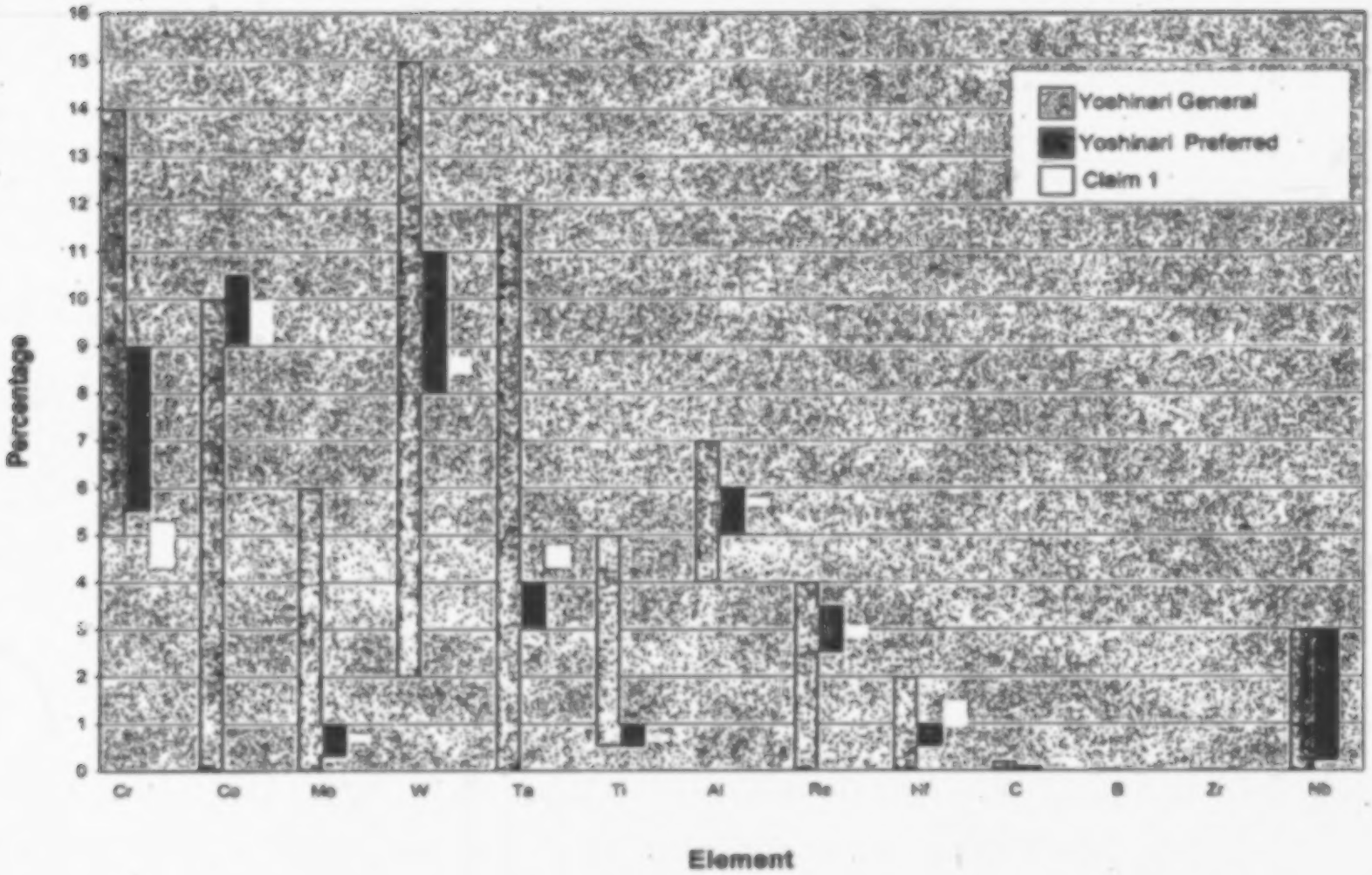
APPENDIX F

BAR GRAPHS

Comparing the breadth of the ranges for each minor alloy element disclosed in Yoshinari's broad disclosure and preferred disclosure to the narrow range for those elements in Harris and Wahl patent application claims.

SEE FOLD OUT EXHIBIT


0.2
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Percentage
Yoshinari General
Yoshinari Preferred
Claim 1
C
B
Zr
Element


Yoshinari General
Yoshinari Preferred
Claim 1
Percentage
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Cr
Co
Mo
W
Ta
Ti
Al
Re
Hf
C
B
Zr
Nb
Element

FILED
DEC 7 - 2005
OFFICE OF THE

No. 05-378

In the Supreme Court of the United States

KENNETH HARRIS AND JACQUELINE B. WAHL,
PETITIONERS

v.

JONATHAN W. DUDAS,
DIRECTOR, PATENT AND TRADEMARK OFFICE

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

BRIEF FOR THE RESPONDENT IN OPPOSITION

PAUL D. CLEMENT
Solicitor General
Counsel of Record
PETER D. KEISLER
Assistant Attorney General
ANTHONY J. STEINMEYER
MARK S. DAVIES
Attorneys
Department of Justice
Washington, D.C. 20530-0001
(202) 514-2217

QUESTION PRESENTED

Whether the court of appeals properly concluded that petitioner's patent claims were obvious in light of existing patents.

TABLE OF CONTENTS

Page

Opinions below 1
Jurisdiction 1
Statement 2
Argument 6
Conclusion 11

TABLE OF AUTHORITIES

Cases:

Baird, In re, 16 F.3d 380 (Fed. Cir. 1994) 9
Bonito Boats, Inc. v. *Thunder Craft Boats, Inc.*, 489 U.S. 141 (1989) 2
Graham v. *John Deere Co.*, 383 U.S. 1 (1966) .. 2, 3, 6, 10
Henze, In re, 181 F.2d 196 (C.C.P.A. 1950) 6
Kumar, In re, 418 F.3d 1361 (Fed. Cir. 2005) 7
Oetiker, In re, 977 F.2d 1443 (Fed. Cir. 1992) 7
Peterson, In re, 315 F.3d 1325 (Fed. Cir. 2003) 7, 9
Piasecki, In re, 745 F.2d 1468 (Fed. Cir. 1984) 6, 7
Surrey, In re, 319 F.2d 233 (C.C.P.A.), cert. denied, 375 U.S. 930 (1963) 6
United States v. *Adams*, 383 U.S. 39 (1966) 2
Woodruff, In re, 919 F.2d 1575 (Fed. Cir. 1990) 8

Constitution, statutes and regulation:

U.S. Const. Art. 1, § 8, Cl. 8. (Patent Clause) 2
Patent Act of 1790, ch. 7, 1 Stat. 109 2
Patent Act of 1793, ch. 11, 1 Stat. 318 2
Patent Act of 1836, ch. 357, 5 Stat. 117 2
Patent Act of 1839, ch. 88, 5 Stat. 353 2

Statutes and regulation—Continued: Page

Patent Act of 1870, ch. 230, 16 Stat. 198 2
Patent Act of 1939, ch. 451, 53 Stat. 1212 2
Patent Act of 1952, ch. 950, 66 Stat. 792 2
35 U.S.C. 1 *et seq.* 2
35 U.S.C. 101 2
35 U.S.C. 102 2
35 U.S.C. 103 ..... 2, 6
35 U.S.C. 103(a) 3
37 C.F.R. 1.56(b) 7

In the Supreme Court of the United States

No. 05-378

KENNETH HARRIS AND JACQUELINE B. WAHL,
PETITIONERS

v.

JONATHAN W. DUDAS,
DIRECTOR, PATENT AND TRADEMARK OFFICE

ON PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

BRIEF FOR THE RESPONDENT IN OPPOSITION

OPINIONS BELOW

The opinion of the court of appeals (Pet. App. 1a-11a) is reported at 409 F.3d 1339. The decision of the United States Patent and Trademark Office Board of Patent Appeals and Interferences (Pet. App. 14a-28a) is unreported. The decision of the Board denying rehearing (Pet. App. 29a-33a) is unreported.

JURISDICTION

The judgment of the court of appeals was entered on May 25, 2005. A petition for rehearing was denied on June 30, 2005 (Pet. App. 12a-13a). The petition for a writ of certiorari was filed on September 16, 2005. The

jurisdiction of this Court is invoked under 28 U.S.C. 1254(1).

STATEMENT

1. The Patent Clause of the Constitution empowers Congress "[t]o promote the Progress of Science and useful Arts by securing for limited Times to * * * Inventors the exclusive Right to their * * * Discoveries." U.S. Const. Art. 1, § 8, Cl. 8. Congress has implemented the Patent Clause through statutory enactments, commonly known as the Patent Acts, that have set out the conditions for obtaining a patent. See, *e.g.*, Patent Act of 1790, ch. 7, 1 Stat. 109; Patent Act of 1793, ch. 11, 1 Stat. 318; Patent Act of 1836, ch. 357, 5 Stat. 117; Patent Act of 1839, ch. 88, 5 Stat. 353; Patent Act of 1870, ch. 230, 16 Stat. 198; Patent Act of 1939, ch. 451, 53 Stat. 1212; Patent Act of 1952, ch. 950, 66 Stat. 792.

The Patent Act of 1952, as amended, provides the currently controlling law governing the issuance of patents. See 35 U.S.C. 1 *et seq.* Sections 101 through 103 set out the basic requirements to qualify for a patent. As this Court has explained, those Sections indicate that "patentability is dependent upon three explicit conditions: novelty and utility as articulated and defined in § 101 and § 102, and non-obviousness * * *, as set out in § 103." *Graham* v. *John Deere Co.*, 383 U.S. 1, 12 (1966); see *United States* v. *Adams*, 383 U.S. 39, 48 (1966); see generally *Bonito Boats, Inc.* v. *Thunder Craft Boats, Inc.*, 489 U.S. 141, 146-151 (1989).

Of importance here, Section 103 of the Patent Act articulates the requirement, added explicitly in 1952, that the subject matter of the invention must be "non-obvious." 35 U.S.C. 103. Section 103 specifically

states that a patent may not be obtained if the differences between the subject matter and the prior art "are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art." 35 U.S.C. 103(a). In other words, "[p]atentability is to depend, in addition to novelty and utility, upon the 'non-obvious' nature of the 'subject matter sought to be patented' to a person having ordinary skill in the pertinent art." *Graham*, 383 U.S. at 14 (quoting 35 U.S.C. 103(a)).

2. Petitioners filed U.S. Patent Application 09/797,326 ('326 Application) claiming a nickel-based superalloy for turbine engine blades that experience high temperatures. Pet. App. 1a-2a. "The alloy disclosed in the '326 Application contains nickel, plus twelve additional elements defined by a range of weight percentages." *Id.* at 2a. For example, Claim 1 refers to a weight percentage of "about 4.3% to about 5.3% Chromium (Cr)." *Ibid.* (citation omitted). The '326 Application discloses an embodiment of the claimed alloy—"CMSX®- 486"—that has "improved stress-rupture properties over other alloys." *Id.* at 2a-3a.

A patent examiner within the Patent and Trademark Office (PTO) rejected the application. See C.A. App. 301-310. The examiner ruled that the claims were obvious in view of a previously issued patent on nickel-based alloys, referred to as the "Yoshinari" patent. C.A. App. 303 (citing 35 U.S.C. 103(a)).[1] The patent examiner noted, for example, that "the ranges of Yoshinari's [chromium]" "overlap the subject matter of claim 1." Pet. App. 17a. The Yoshinari patent discloses a weight per-

[1] The examiner also rejected petitioners' application as obvious based on a second patent, but the court of appeals did not address that alternative rejection. Pet. App. 3a n.1.

cent of chromium of "5 to 14%, preferably 5.5 to 9%" while petitioners' patent gives a range of "about 4.3 to about 5.3." *Id.* at 17a n.3, 19a; C.A. App. 303-304. Moreover, "it would have been within the expected skill of a routineer in the art to have optimized the contents of these elements in order to maximize the properties" of the superalloy. *Id.* at 304. In an effort to overcome the obviousness finding, petitioners suggested that "CMSX®-486" displayed "unexpected results relative to the prior art range." Pet. App. 23a. The examiner found that argument unpersuasive. See C.A. App. 308-309.

The PTO's Board of Patent Appeals and Interferences (Board) affirmed the examiner's rejection of petitioners' patent application. The Board stated that a "*prima facie* case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art." Pet. App. 21a. It concluded that "[s]uch is the case here." *Ibid.* The Board additionally concluded that a "person of ordinary skill in the art would have reasonably expected that the chromium content affects the hot corrosion resistance of the superalloy" and thus "would have recognized the suitability of adjusting the content of the disclosed elements within the disclosed ranges." *Ibid.* "Since the ranges of claim 1 overlap[] the invention of Yoshinari, the burden is shifted to [petitioners] to establish that the claimed invention would not have been obvious." *Ibid.* The Board evaluated petitioners' claim that they had carried that burden because CMSX®-486 "exhibits superior results." *Id.* at 22a. The Board found, however, that petitioners "ha[d] not explained why [the] results obtained are unexpected" or why their "single example is representative of the entire claimed range." *Id.* at 23a.

The United States Court of Appeals for the Federal Circuit affirmed. Pet. App. 1a-11a. The court of appeals stated that "a prima facie case of obviousness arises when the ranges of a claimed composition overlap the ranges disclosed in the prior art." *Id.* at 4a (collecting cases). The court further explained that, "[e]ven without complete overlap of the claimed range and the prior art range, a minor difference shows a prima facie case of obviousness." *Ibid.* The court pointed out that eleven of Yoshinari's disclosed ranges completely encompass petitioners' claimed ranges. *Ibid.* "Only Yoshinari's chromium range (5.0 - 14.0) does not completely encompass the '326 Application's chromium range (4.3 - 5.3)." *Ibid.* Rejecting petitioners' view that Yoshinari's ranges were too broad to disclose any specific alloy, the court of appeals noted that this case does not involve ranges that are "too broad to teach a subset range." *Id.* at 7a.

Having found that the PTO established a prima facie case of obviousness, the court of appeals considered whether petitioners had met their burden of rebutting that prima facie showing. Pet. App. 8a-9a. The court concluded that the improved stress-rupture properties of petitioners' CMSX®-486 "does not represent a 'difference in kind' that is required to show unexpected results." *Id.* at 9a (citation omitted). Furthermore, because the Yoshinari patent taught that "limiting the percentages of chromium" would improve "hot corrosion resistance," the increase in stress-rupture properties of CMSX®-486 was not unexpected. *Id.* at 9a-10a. And, even assuming that the results of CMSX®-486 were unexpected, petitioners "needed to show results covering the scope of the claimed range," not just the unexpected results of one compound. *Id.* at 10a.

ARGUMENT

The court of appeals correctly concluded that the PTO properly rejected petitioners' patent application because the claimed invention was obvious. The court of appeals' fact-based decision does not conflict with any decision of this Court or with any decision of the Federal Circuit or another court of appeals. Further review is not warranted.

1. The PTO has primary responsibility for "sifting out unpatentable material." *Graham*, 383 U.S. at 18. In *Graham*, the Court identified the "basic factual inquiries" relevant to the determination whether a claimed invention is obvious within the meaning of Section 103. *Id.* at 17. "Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved." *Ibid.* In addition, the Court identified "secondary considerations" such as "commercial success" and "failure of others" that may "give light" to the nonobviousness inquiry. *Ibid.*

When examining a patent for nonobviousness, the PTO employs a two-step process, asking "(1) whether a prima facie case of obviousness has been established, and, if so, (2) whether the affidavits presented are sufficient to overcome the prima facie case of obviousness." *In re Piasecki*, 745 F.2d 1468, 1472 (Fed. Cir. 1984) (quoting *In re Surrey*, 319 F.2d 233, 235 (C.C.P.A.), cert. denied, 375 U.S. 930 (1963)).[2] "If rebuttal evidence of

---

[2] The *Piasecki* court observed that, while the "origin" of that prima facie inquiry is "uncertain," "its ancestry includes mechanisms which were called 'presumptions of unpatentability.'" 745 F.2d at 1472 (quoting *In re Henze*, 181 F.2d 196, 201 (C.C.P.A. 1950)).

adequate weight is produced, the holding of *prima facie* obviousness, being but a legal inference from previously uncontradicted evidence, is dissipated." 745 F.2d at 1472. Accord, *e.g.*, *In re Oetiker*, 977 F.2d 1443, 1445 (Fed. Cir. 1992) ("*prima facie* case is a procedural tool of patent examination, allocating the burdens of going forward as between examiner and applicant"); *In re Kumar*, 418 F.3d 1361 (Fed. Cir. 2005) (same). See 37 C.F.R. 1.56(b) ("A *prima facie* case of unpatentability is established when the information compels a conclusion that a claim is unpatentable * * * before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.").

2. Here, both the Board and the court of appeals applied a sensible and long-standing refinement of the prima facie obviousness inquiry, by presuming that a chemical composition claim is obvious if it merely identifies a subset of a previously identified chemical composition. Pet. App. 4a, 21a-22a. The presumption is a reasonable one: If a patent application claims a range of chemical compositions, and the claimed range is within the range of compositions already protected by a patent, the application does not appear to rest on any new learning or discovery. The Federal Circuit has repeatedly recognized that a claimed invention that is merely a narrower version of a patented invention is prima facie obvious. See, *e.g.*, *Kumar*, 418 F.3d at 1366 ("A *prima facie* case of obviousness may be made when the only difference from the prior art is a difference in the range or value of a particular variable."); *In re Peterson*, 315 F.3d 1325, 1330 (Fed. Cir. 2003) ("the existence of overlapping or encompassing ranges shifts the burden to the applicant to show that his invention would not have been